

ATOMIC LAYER DEPOSITION FOR TURBINE COMPONENTS
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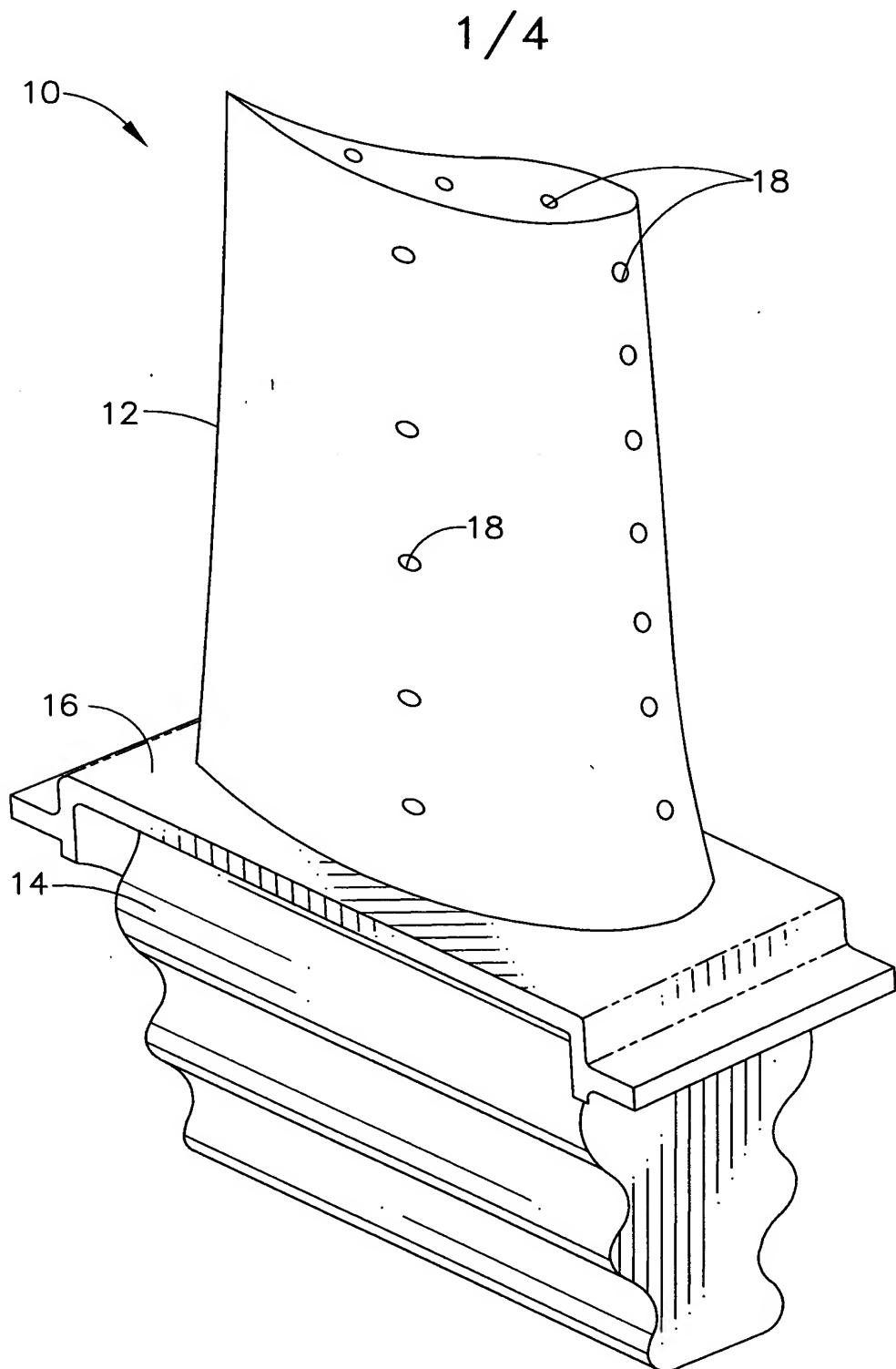


FIG. 1

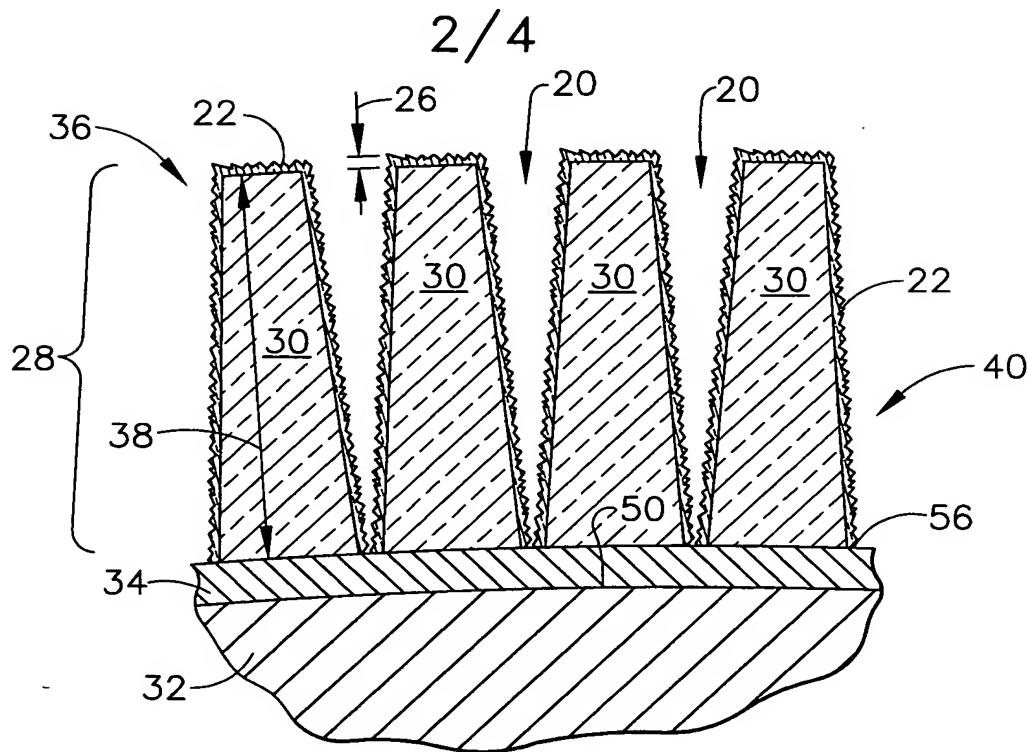


FIG. 2

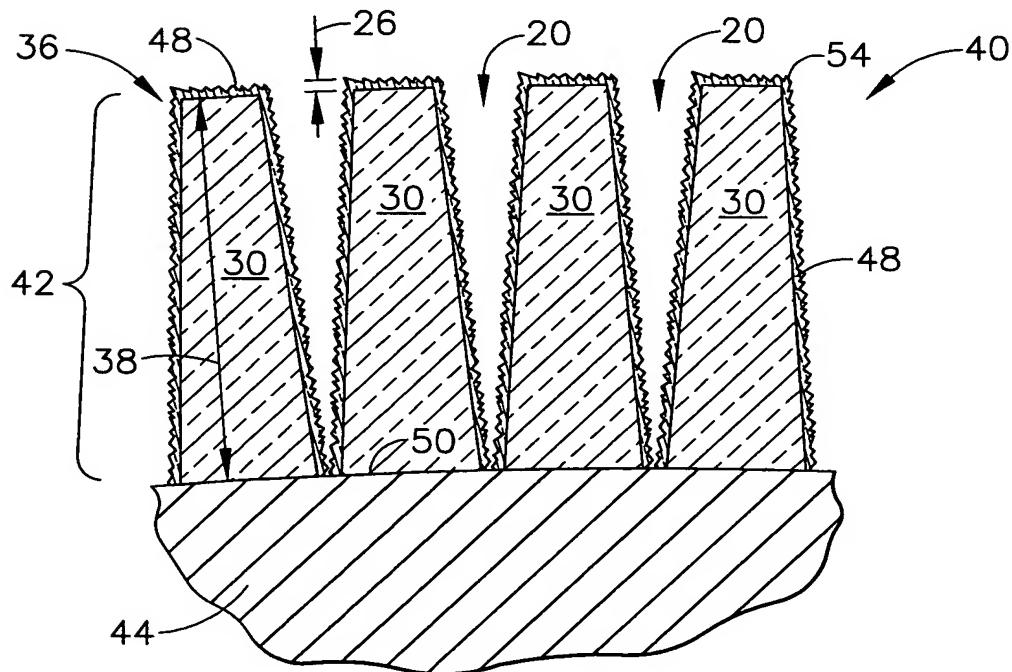


FIG. 3

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DEPOSIT A TANTALUM OXIDE (Ta_2O_5) LAYER ONTO A SILICON-BASED SUBSTRATE (ONE OF A SILICON NITRIDE SUBSTRATE AND A SILICON CARBIDE SUBSTRATE), BY ELECTRON BEAM PHYSICAL VAPOR DEPOSITION, SUCH THAT THE TANTALUM OXIDE (Ta_2O_5) LAYER IS IN THE FORM OF COLUMNAR GRAINS.

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DEPOSIT AN INORGANIC LAYER (SELECTED FROM THE GROUP CONSISTING OF ALUMINUM OXIDE (Al_2O_3), TANTALUM CARBIDE (TaC), HAFNIUM OXIDE (HfO_2), MIXTURES THEREOF, NANO-LAMINATES THEREOF, AND ALLOYS THEREOF, OR SELECTED FROM THE GROUP CONSISTING OF SILICON CARBIDE (SiC), SILICON NITRIDE (Si_3N_4), OXYCARBIDES, CARBONITRIDES, MIXTURES THEREOF, NANO-LAMINATES THEREOF, AND ALLOYS THEREOF), BY ATOMIC LAYER DEPOSITION, ONTO THE TANTALUM OXIDE (Ta_2O_5) LAYER, SUCH THAT THE INORGANIC LAYER IS UNIFORM AND CONFORMAL.

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FIG. 4

DEPOSIT AN YTTRIA-STABILIZED ZIRCONIA LAYER ONTO A NICKEL SUPERALLOY TURBINE COMPONENT (SELECTED FROM THE GROUP CONSISTING OF A TURBINE BLADE, A TURBINE VANE, A COMBUSTOR FUEL NOZZLE, AND A COMBUSTOR SHIELD), BY ELECTRON BEAM PLASMA VAPOR DEPOSITION, SUCH THAT THE YTTRIA-STABILIZED ZIRCONIA LAYER IS IN THE FORM OF COLUMNAR GRAINS.

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DEPOSIT AN INORGANIC LAYER (SELECTED FROM THE GROUP CONSISTING OF ALUMINUM OXIDE (Al_2O_3), TANTALUM CARBIDE (TaC), TANTALUM OXIDE (Ta_2O_5), HAFNIUM OXIDE (HfO_2), MIXTURES THEREOF, NANO-LAMINATES THEREOF, AND ALLOYS THEREOF; OR SELECTED FROM THE GROUP CONSISTING OF SILICON CARBIDE (SiC), SILICON NITRIDE (Si_3N_4), OXYCARBIDES, CARBONITRIDES, MIXTURES THEREOF, NANO-LAMINATES THEREOF, AND ALLOYS THEREOF), BY ATOMIC LAYER DEPOSITION, ONTO THE YTTRIA-STABILIZED ZIRCONIA LAYER, SUCH THAT THE INORGANIC LAYER IS UNIFORM AND CONFORMAL.

FIG. 5

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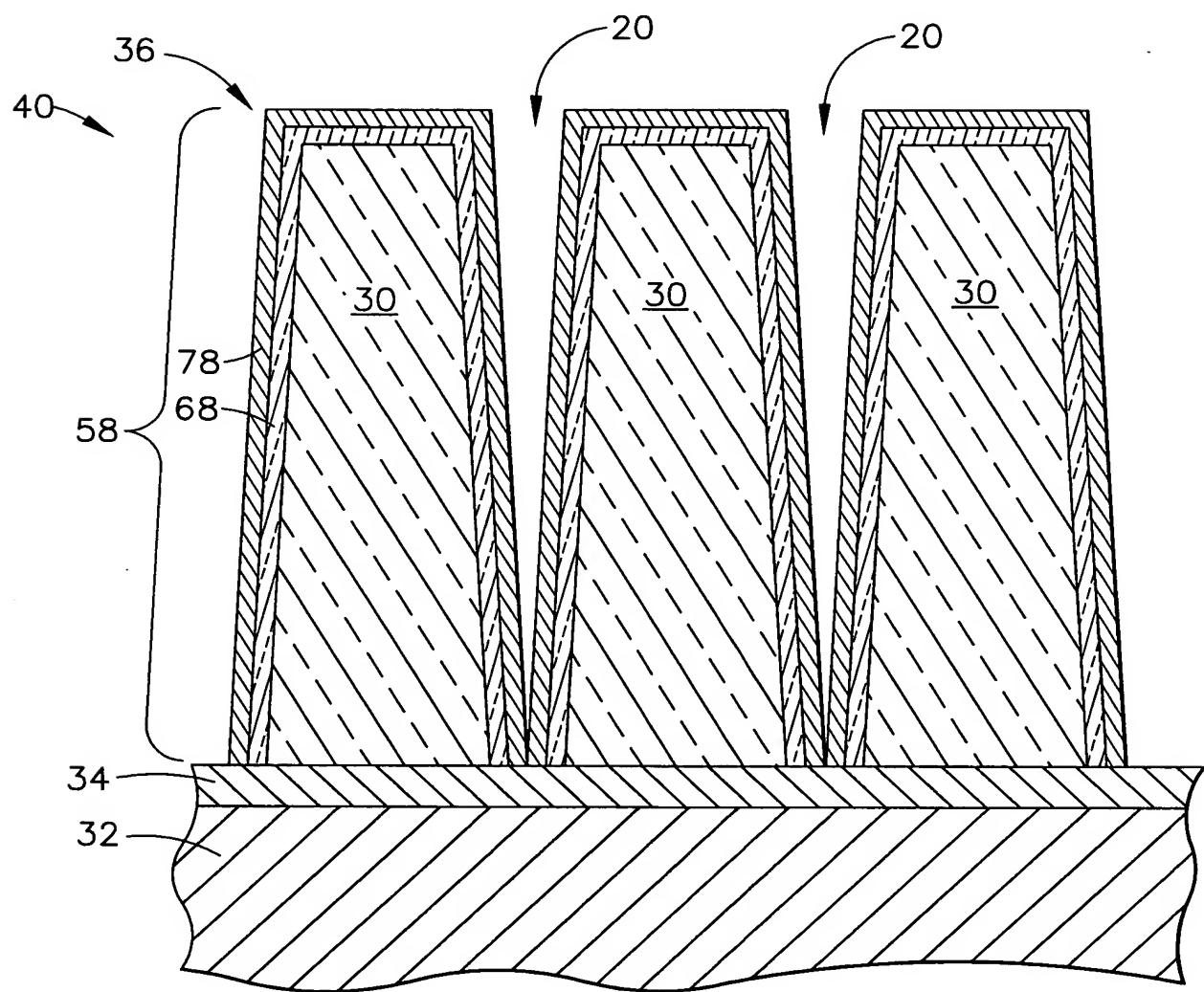


FIG. 6